

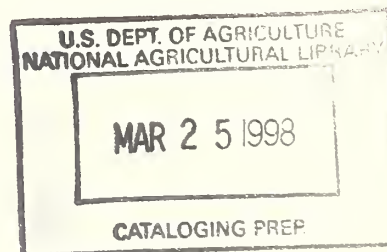
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GRAIN-FED VERSUS GRASS-FED BEEF PRODUCTION

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by

James E. Nix, Agricultural Economist
Commodity Economics Division, ERS

ABSTRACT

The poor 1974 U.S. corn crop caused sharp rises in feed prices and many changes were made in beef production. Large numbers of cattle were forced to slaughter because of short feed supplies and nongrain-fed beef slaughter increased. World food shortages prompted much discussion about beef production being a wasteful use of food producing resources. Quantities of grain consumed by beef cattle per pound of beef produced are, however, less than that assumed by many.

KEYWORDS: Beef production, grass-fed, grain-fed, forages, feed grains, feed prices.

The poor 1974 U.S. feed grain crop and the World Food Conference in Rome brought world food needs to the forefront of the U.S. news media and provoked much discussion about ways to alleviate food shortages. The beef cattle industry has emerged as the center of attention in many of these discussions. Many assertions have been made about the cost and possibility of producing various types of beef, and about beef production being a wasteful use of food producing resources. Some rather drastic changes in feed supplies and costs have reversed past trends in the beef cattle industry during the past several months. This article reviews the current situation and puts forth some ideas about the direction beef cattle production might take in the future.

Past Trends and Current Situation

The trend toward marketing a larger percentage of the beef cattle as grain-fed beef continued until 1974. This shift to a larger and larger proportion of fed cattle developed during a period of adequate supplies of feed grains as evidenced by the relatively low feed grain prices that prevailed, and ending feed grain stocks that were averaging about 25 percent of the year's production. Furthermore, cattle prices remained relatively stable compared with recent fluctuations, while trending upward for several years prior to 1972.

Some of the more significant events which led to the present situation began to take place in 1972. During 1972, feeder cattle prices started to rise sharply and

continued to rise into 1973, reaching a peak about midyear. This sharp rise in feeder cattle prices was prompted by earlier low grain prices, profits in the cattle feeding industry, and an influx of outside capital that led to a rapid expansion of commercial feedlot capacity. Feedlots with a capacity of 1,000 head or more accounted for about 1 percent of all feedlots in 1968 and 1.4 percent in 1973. These feedlots, however, increased their share of total fed cattle marketings from about 47 percent in 1968 to almost 65 percent in 1973. During this rapid expansion of feedlot capacity, cattle feeders bid up feeder cattle prices which prompted further increases in the cow herd. Although fat cattle prices also rose, the increase did not match that for feeder cattle and some rather large negative price margins developed by mid-to late-1973. This left many feeders with substantial losses. Since mid-1973, however, feeder cattle prices have declined considerably to their present low levels and the price margin has been reversed to a positive price margin the past several months.

Beginning in mid-1972, feed grain prices also started to increase from the low levels of the previous decade. The sharp upward surge in feed grain exports was a major factor in these price increases. Then in 1974, a devastating blow was dealt the cattle industry when extremely poor growing conditions drastically reduced the 1974 corn crop and also reduced forage supplies. Feed grain prices rose sharply and losses to cattle feeders increased. Cattle feeders reacted by reducing feedlot placements substantially, particularly in the commercial

feeding areas, and many who had invested capital earlier now withdrew, aggravating the decline in feeding activity and leaving record large numbers of cattle outside of feedlots to compete for a reduced and limited supply of forage. The reduced demand for feeders and reduced feed supplies forced many animals from the pastures and ranges to slaughter, resulting in an increase in the slaughter of animals that had received little or no grain feeding and decreases in slaughter of grain-fed beef.

These events, coupled with the current perplexing situation of the beef industry, have led to the expression of varied opinions about beef production. Some topics relevant to the beef production situation and some ideas about future beef production are reviewed below.

Beef Production-Grain and/or Grass-Fed

A common issue, and one that has been widely discussed, is that beef production is a wasteful use of food producing resources. This issue stems from the fact that a large percentage of the steers and heifers slaughtered are finished on rations that include large amounts of grain. A contributing factor to this issue is a misunderstanding about the number of animals being fed the grain rations at any given time. On January 1, 1975, about 10.2 million cattle were in feedlots and being fed the grain rations. This represented about 9 percent of the total beef cattle and calf inventory which was estimated to be 116.5 million head. Therefore, the weakness of the issue that beef production is a wasteful use of food producing resources stems from the fact that (1) the animals being fed rations that are largely grain are only finished on these rations and are dependent on forages and other roughages prior to being placed in feedlots and (2) that only a small percent of all cattle and calves are being fed the grain rations at any given time. True, over 70 percent of total cattle slaughter was fed cattle for several years prior to 1974, but this has recently dropped to about 60 percent. After making allowances for the weight an animal gains prior to being placed on feed in the feedlot and the beef produced by animals such as cull beef cows and grass-fed beef that are never placed on feed, the total pounds of beef produced while cattle are being fed the feedlot grain ration have accounted for about 30 to 35 percent of the annual beef production since 1965.

To illustrate the amount of grain consumed by grain-fed beef, the placement of a 600 pound feeder steer in a feedlot and the selling of this steer at 1,050 pounds is used as an example. It is often quoted that it takes x pounds of feed to produce y pounds of beef, for example, 10 pounds of feed per pound of beef, when producing grain-fed beef. This is sometimes construed to mean that it would take over 10,000 pounds of grain to produce a 1,050 pound fat steer. This is a gross overestimate of the grain actually fed. It is likely that roughages accounted for almost all of the ration prior to placement in the feedlot. Furthermore, grain normally accounts for about 65 percent of the feedlot ration.

Therefore, of the 10 pounds of feed fed per pound of beef, only 6.5 pounds would be grain. The other 3.5 pounds normally consist of about 0.5 pounds of other concentrates and 3 pounds of roughages. The amount of grain fed to the 1,050 pound fat steer would more likely be about 2,900 pounds (6.5 pounds of grain for each of the 450 pounds of weight added in the feedlot or less than 3 pounds of grain per pound of liveweight at slaughter).

Table 1 shows an estimate of the grain consumed by beef cattle and swine for the crop years 1965/66 through 1973/74. These data show that swine consume more corn than beef cattle, and also that total grain consumed by swine is over 90 percent of the amount consumed by all beef cattle, even though pork production is only about 60 percent of beef production. Translated into pounds of grain consumed per pound of carcass weight meat produced, an upward trend is observed for beef. These data do indicate, however, that the amount of grain consumed by beef cattle per pound of beef produced has declined during the recent grain shortage. The upward trend in pounds of grain consumed per pound of beef produced is the result of longer feeding periods and not that beef cattle are becoming less efficient users of grain.

The preliminary estimates of gross livestock production for the 1973/74 crop year show that pounds of grain consumed per pound of carcass weight beef and pork produced are 4.1 and 6.3, respectively. The pounds of grain consumed per pound of retail weight beef and pork produced during this same period were 5.6 and 8.4, respectively. These data show that the amount of grain consumed per pound of beef produced is much less than that which is often quoted. They also show that fewer pounds of grain are used to produce a pound of beef than to produce a pound of pork because a substantial quantity of the beef marketed represents weight gains from roughages.

An examination of the supply and utilization of feed grains since 1965 shows that feed grains used for livestock feed increased steadily during a period of relatively low prices and high carryover for feed grains which ended about 1972. In this period relatively low priced fertilizer and fuel were important factors in the level of grain production. As feed grain supplies decreased and prices increased during the past few years, the amount of grain fed to livestock declined, table 2.

Roughages are a large and important part of beef cattle rations. Only small quantities of grain are normally fed to beef cattle outside of feedlots. In the 1972/73 crop year, a period when almost 97 percent of the steers and heifers slaughtered were finished on grain rations, roughages accounted for almost 75 percent of the total feed consumption of beef cattle. For cattle on feed in the 1972/73 period, almost 28 percent of the feed consumed was roughages and for other beef cattle the percentage was 92, table 3. These roughages, which cattle can convert to food for humans, are inedible by humans. If not utilized by cattle, most of these

roughages—which produce millions of pounds of meat—would be wasted. Furthermore, much of the land used for producing roughages is not suitable for grain production. A brief review of the U.S. land resources and some of the major land uses can provide some insight into this situation.

In 1969, about 57 percent (1,283 million acres) of the U.S. land area was used for agricultural purposes. Major uses of this 1,283 million acres were: cropland, 472 million acres (37 percent); grassland pasture and range, 604 million acres (47 percent); woodland grazed, 198 million acres (15 percent); and farmsteads and farm roads, 9 million acres (1 percent). Almost 19 percent (88 million acres) of the cropland was used for pasture, table 4.

Part of the 802 million acres being used for grassland pasture and range and as woodland grazed could be converted to cropland. Under current and past cost-price relationships, however, this has not been a feasible alternative for most of this land. Therefore, the situation that has evolved is one that includes not only the 604 million acres of grassland pasture and range plus 198 million acres of woodland grazed, but also the use of 88 million acres of cropland for pasture.

In the quest to alleviate world food shortages, feasible productive capabilities of most of the grassland pasture and range and woodland grazed other than the production of forages for cattle is quite limited. Forage yields of the land devoted to forage production ranges from woodland grazing which is the least productive to cropland pasture, the most productive and also that which is most competitive with other crop production.

A Forest-Range Task Force Study (5), which estimated the acreage of land in the forest-range environment and the forage produced on this land, gives some indication of the amount of forage produced on lands with almost no feasible grain production potential. This study shows that in 1970 about 835 million acres of the 1.2 billion acres of land in the forest-range environment in the conterminous U.S. were grazed by livestock and that it produced 213.1 million animal unit months (AUM's) of grazing.

Even though a sizable portion of the beef cattle ration comes from roughages and even though there is a large production of roughages from land with little other feasible production alternatives, production of present day quantities and qualities of beef would be difficult without some grain feeding. To maintain the production of beef approximating current supplies for any extended period would require a big increase in roughage production, more than is presently feasible. Droughts, such as occurred in 1974 and reduced roughage supplies, would cause more severe disruptions in the cattle market than have occurred under present conditions if forages were the sole source of cattle feed.

Costs for roughage production, like most other agricultural production costs, have soared during the past year. For some time a portion of the roughage produced in various regions of the U.S. has been viewed

as a relatively cheap source of feed. This is roughage produced in the more arid regions of the U.S. and on land which has little other production potential. The potential for increasing the productivity of roughages on this land is very limited or quite expensive. The greatest potential for increasing roughage production with current feasible technology is in the more humid regions. Increased production in the humid regions, however, is highly dependent on increased rates of fertilization, particularly nitrogen, which has become very costly.

Due to the soaring cost of producing roughages and the increased cost of other inputs, the cost of producing grass-fed beef has increased considerably. For many producers these costs have increased to where the cost of producing grass-fed beef is about as high, if not higher, than that for producing grain-fed beef at current grain prices. Because of the large supply of beef and short supply of feeds—grains and roughages, cattlemen have been forced to sell beef at prices much below total production costs. After current inventories of cattle are reduced, cattlemen are not likely to continue to produce grass-fed beef for prices like they have been receiving recently, unless production costs decline. Grass-fat beef is being marketed today at somewhat lower prices under such names as grass-fed, forage-fed, non-fed, and baby beef. The availability of this beef is the result of (1) the excess inventory of cattle and (2) the short feed supplies.

Future Beef Production

As in the past, the type of beef produced and the kind of feeds used to produce it will be dictated by economics. If grain prices are cheap relative to other sources of feed, then more grain will be used. If grain prices are high, the amount of grain fed will be reduced, as it has recently.

Beef cattle, because they are ruminants, can use roughages which man and other monogastric animals cannot. Currently large quantities of roughages are produced in the U.S. and with technological advancements the production of roughages will likely increase, particularly on land not suitable for grain production. Grains will continue to be an important part of the beef cattle ration because of the more rapid gains obtained from feeding grain and because more pounds of meat can be produced from an acre of grain than from an acre of roughage. Also, grain feeding makes an excellent product out of a good one.

There are also many byproducts of grain production such as straw and corn stalks that can be utilized by ruminant animals. Salvaging of crop residues are potential sources of large quantities of feed for beef cattle (3). Technological advancements will likely make these and other byproducts more feasible sources of feed in the future.

The switch to slaughtering more nongrain-fed steers and heifers that has occurred in 1974 and 1975 is

probably a temporary situation. Numerous factors, which in themselves are temporary, led to this situation. The extremely poor growing conditions for feed grains and forages in many regions of the U.S., together with relatively large exports of feed grains, substantially reduced feed supplies during 1974 and caused feed prices to increase sharply. This, coupled with a record large cattle inventory, forced many cattle to market earlier than they would have under usual conditions. Many of these cattle went to market as grass-fed steers and heifers rather than being finished on grain.

This situation is expected to change in the future and nearly all of the steers and heifers will again be finished on grain. The grain feeding period may be reduced from that which was common in the early 1970's because of several factors, including the new grade changes to become effective in April 1975. Part of any reduction in the feeding period will probably be the result of placing

heavier cattle on feed. Another part of the reduction could come from slaughtering animals at somewhat lighter weights. Reductions in slaughter weights would, however, reduce the pounds of beef produced per brood cow and a given number of cows would produce less total beef.

Feed grain production is also expected to increase in the future. A study conducted by ERS in 1973 (4) estimated that the U.S. has the capacity under favorable conditions to substantially increase feed grain production in the next 10 years. If realized, this increased feed grain production will lead to more grain-fed beef being produced in the future. The time required to change the current situation from one of reducing the percentage of steers and heifers being finished on grain to increasing the percentage will be strongly influenced by the size of this year's feed grain crop.

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**Table 1—Grain consumed, meat produced, and grain consumed per pound
of meat produced for beef and pork, 1965-1973**

	Unit	Crop year beginning October 1								
		1965	1966	1967	1968	1969	1970	1971	1972	1973 ^a
Grain consumed by										
Cattle on feed:										
Corn	1,000 ton	10,539	12,020	14,656	17,038	18,925	18,167	22,150	24,761	22,871
Sorghum	do.	8,486	8,789	8,141	10,318	10,459	11,866	12,072	11,750	9,663
Other	do.	2,995	3,259	4,335	6,197	7,912	8,125	9,002	5,396	3,142
Total	do.	22,020	24,068	27,132	33,553	37,296	38,158	43,224	41,907	35,676
Other beef cattle:										
Corn	do.	4,594	4,931	5,047	5,084	5,669	5,655	6,008	7,065	8,320
Sorghum	do.	791	850	877	882	697	1,097	1,107	1,028	1,194
Other	do.	1,235	1,336	1,421	1,433	1,843	1,756	1,727	1,651	1,194
Total	do.	6,620	7,117	7,345	7,399	8,209	8,508	8,842	9,744	10,708
All beef cattle:										
Corn	do.	15,133	16,951	19,703	22,122	24,594	23,822	28,158	31,826	31,191
Sorghum	do.	9,277	9,639	9,018	11,200	11,156	12,963	13,179	12,778	10,857
Other	do.	4,230	4,595	5,756	7,630	9,755	9,881	10,729	7,047	4,336
Total	do.	28,640	31,185	34,477	40,952	45,505	46,666	52,066	51,651	46,384
Swine:										
Corn	do.	35,309	38,502	40,522	39,140	38,834	39,541	39,592	43,205	40,024
Sorghum	do.	1,646	1,501	1,134	1,256	1,473	1,522	1,334	606	1,079
Other	do.	3,602	3,465	2,812	2,711	2,989	4,234	4,380	3,251	2,137
Total	do.	40,557	43,468	44,468	43,107	43,296	45,297	45,306	47,062	43,240
Meat produced										
Fed beef	Mil. lb.	12,796	13,964	14,527	15,211	16,532	16,569	17,112	16,851	16,374
Other beef	do.	6,772	6,282	6,067	5,738	5,128	5,417	4,963	4,501	6,279
Total beef ...	do.	19,568	20,246	20,594	20,949	21,660	21,986	22,075	21,352	22,653
Pork	do.	10,909	12,424	12,903	13,218	12,830	14,882	13,951	12,913	13,677
Grain consumed per pound of meat produced										
Fed beef	Pound	3.4	3.4	3.7	4.4	4.5	4.6	5.1	5.0	4.4
Other beef ...	do.	2.0	2.3	2.4	2.6	3.2	3.1	3.6	4.3	3.4
Total beef ..	do.	2.9	3.1	3.3	3.9	4.2	4.2	4.7	4.8	4.1
Pork	do.	7.4	7.0	6.9	6.5	6.7	6.1	6.5	7.3	6.3

^aPreliminary. Source: Grain consumption: 1965-1970 [1]; 1971-1973 unpublished updates to [1]. Beef production: Fed and other are unpublished estimates prepared by CED-ERS staff. Total beef and pork [7].

Table 2—Acreage, supply, and utilization of feed grains, 1965-1974

	Unit	Crop year beginning October 1									
		1965	1966	1967	1968	1969	1970	1971	1972	1973 ^a	1974 ^b
Acreage planted	Mil. ac.	116.4	117.2	120.9	116.7	115.3	118.8	128.0	115.1	121.4	122.6
Acreage harvested	do.	96.1	97.9	101.0	97.3	95.5	99.3	106.3	94.0	102.4	100.7
Supply											
Beginning stock	Mil. ton	54.8	42.1	37.2	48.5	50.2	48.6	33.2	48.4	32.4	22.2
Production	do.	158.0	159.0	178.9	170.5	177.4	160.1	207.7	199.9	205.0	165.1
Imports	do.	.3	.3	.3	.3	.4	.4	.5	.4	.2	.5
Total	do.	213.1	201.4	216.4	219.3	228.0	209.1	241.4	248.7	237.6	187.8
Utilization											
Livestock feed	dol	126.8	126.9	128.9	134.7	141.8	138.9	149.0	156.2	153.5	123.3
Food, seed, and industry	do.	15.1	15.3	15.7	16.0	16.4	16.3	16.7	17.0	17.5	18.1
Total domestic	do.	141.9	142.2	144.6	150.7	158.2	155.2	165.7	173.2	171.0	141.4
Exports	do.	29.1	22.0	23.3	18.4	21.2	20.7	27.3	43.1	44.4	33.7
Total	do.	171.0	164.2	167.9	169.1	179.4	175.9	193.0	216.3	215.4	175.1
Ending stock	do.	42.1	37.2	48.5	50.2	48.6	33.2	48.4	32.4	22.2	12.7
Season average corn price received by farmers	Dol./bu.	1.16	1.24	1.03	1.08	1.15	1.33	1.08	1.57	2.55	3.51

^aPreliminary. ^bEstimated. Source: [6].

Table 3—Beef cattle feed consumption (corn equivalent units) by type of feed and percent each type is of total, 1965-73

	Crop year beginning October 1								
	1965	1966	1967	1968	1969	1970	1971	1972	1973 ^a
	<i>1,000 tons</i>	<i>1,000 tons</i>	<i>1,000 tons</i>	<i>1,000 tons</i>	<i>1,000 tons</i>	<i>1,000 tons</i>	<i>1,000 tons</i>	<i>1,000 tons</i>	<i>1,000 tons</i>
Cattle on Feed									
Feed grains	20,988	23,021	26,151	32,229	35,989	36,789	41,817	40,605	39,656
Other concentrates	5,161	4,617	4,051	4,305	4,741	5,653	4,979	5,157	3,714
Roughages	11,147	12,638	13,453	13,991	16,013	15,974	16,958	17,608	18,106
All feed	37,296	40,276	43,655	50,525	56,743	58,416	63,754	63,370	61,476
Other Beef Cattle									
Feed grains	6,620	7,117	7,345	7,399	8,209	8,508	8,842	9,744	10,708
Other concentrates	3,417	3,035	3,049	3,246	3,525	3,850	3,989	3,716	2,349
Roughages	119,959	120,900	125,614	125,308	135,575	136,896	146,551	155,780	162,547
All feed	129,996	131,052	136,008	135,953	147,309	149,254	159,382	169,240	175,604
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Cattle on Feed									
Feed grains	56.3	57.2	59.9	63.8	63.4	63.0	65.6	64.1	64.5
Other concentrates	13.8	11.5	9.3	8.5	8.4	9.7	7.8	8.1	6.0
Roughages	29.9	31.3	30.8	27.7	28.2	27.3	26.6	27.8	29.5
All feed	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Other Beef Cattle									
Feed grains	5.1	5.4	5.4	5.4	5.6	5.7	5.5	5.8	6.1
Other concentrates	2.6	2.3	2.2	2.4	2.4	2.6	2.5	2.2	1.3
Roughages	92.3	92.3	92.4	92.2	92.0	91.7	92.0	92.0	92.6
All feed	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

^aPreliminary. Source: 1965-70 [1]; 1971-1973 unpublished updates to [1].

Table 4—Major agricultural and nonagricultural uses of land in farms and land not in farms, 1969

Land use	Land in farms	Land not in farms	Total
	<i>Million acres</i>	<i>Million acres</i>	<i>Million acres</i>
Agricultural uses of land:			
Cropland	472	---	472
Cropland used for crops	(333)	---	(333)
Soil improvement crops and idle cropland	(51)	---	(51)
Cropland pasture	(88)	---	(88)
Grassland pasture and range	452	152	604
Woodland grazed	62	136	198
Farmsteads, farm roads	9	---	9
Total agricultural land	995	288	1,283
Nonagricultural uses of land:			
Forest land not grazed	50	475	525
Special uses	---	169	169
Urban and other built-up areas	---	(61)	(61)
Primarily for recreation and wildlife	---	(81)	(81)
Public installations and facilities	---	(27)	(27)
Other land	19	268	287
Total nonagricultural land	69	912	981
Total land areas	1,064	1,200	2,264

Source: [2]

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